

### ABSTRACT OF THE DISCLOSURE

In one aspect, the invention provides a photoelectrochemical (PEC) electrode or photoelectrode for use in splitting water by electrolysis. The photoelectrode has an electrically conductive surface in contact with an electrolyte solution. This surface is a doped tin oxide layer, which is in electrical contact with the semiconductor solar cell material of the PEC photoelectrode. In a variation of the present invention, another layer of metal oxide having transparent, anti-reflective, and conductive properties is disposed between the doped tin oxide layer and the semiconductor material.